



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Choi et al.  
Serial No. : 10/053,535 ✓  
Filed : January 15, 2002  
Title : CARBON MONOXIDE AS A BIOMARKER AND THERAPEUTIC AGENT

Art Unit : 1616  
Examiner : Frank I. Choi  
Conf. No. : 7091

**MAIL STOP AMENDMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Applicants request consideration of the references listed on the attached two (2) PTO-1449 forms. Under 37 C.F.R. § 1.98 (a)(2)(ii), only copies of foreign patent documents and/or non-patent literature are enclosed. Copies of any listed U.S. patents or U.S. patent application publications can be provided upon request.

This statement is being filed before receipt of a first Office action on the merits.

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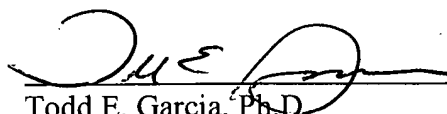
Attorney's Docket No.: 13681-003002

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Respectfully submitted,

Date: \_\_\_\_\_

8/18/06



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Substitute Form PTO-1449

U.S. Department of Commerce  
Patent and Trademark Office

Attorney's Docket No.

13681-003002

Application No.

10/053,535

**Information Disclosure Statement  
by Applicant**

(Use several sheets if necessary)

Applicant

Choi et al.

Filing Date

January 15, 2002

Group Art Unit

1616

**U.S. Patent Documents**

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	A1	6,203,991	03/20/01	Nabel et al.			
	A2						

**Foreign Patent Documents or Published Foreign Patent Applications**

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	B1							

**Other Documents (include Author, Title, Date, and Place of Publication)**

Examiner Initial	Desig. ID	Document
	C1	Appel et al., "The pig as a source of Cardiac xenografts," J. Card. Surg. 16:345-56 (2001).
	C2	Bach, "Heme oxygenase-1 as a protective gene," Wien. Klin. Wochenschr. 114(Suppl):4:1-3 (2002).
	C3	Billiar, "The diverging roles of carbon monoxide and nitric oxide in resuscitated hemorrhagic shock," Crit. Care Med. 27:2842-3 (1999).
	C4	Bracho et al., "Carbon Monoxide Protects against Organ Injury in Hemorrhagic Shock/Resuscitation," Journal of Surgical Research, 107:270, (2002), Abstract.
	C5	Brouard et al., "Carbon monoxide generated by Heme Oxygenase-1 (HO-1) suppresses endothelial cell apoptosis via activation of the p38 mitogen activated protein kinase (MAPK) pathway," Acta Haematologica 103(Suppl 1):64, (2000), Abstract.
	C6	Brouard et al., "Heme oxygenase-1-derived carbon monoxide requires the activation of transcription factor NF-kappa B to protect endothelial cells from tumor necrosis factor-alpha-mediated apoptosis," J. Biol. Chem., 277(20):17950-17961, (2002).
	C7	Brouard et al., "Molecular mechanism underlying the anti-apoptotic effect of Heme oxygenase-1 derived carbon monoxide," Xenotransplantation, 8(Suppl 1): p22 (2001).
	C8	Calabrese et al., "Carbon Monoxide (CO) Prevents Apoptotic Events Related to Ischemia/Reperfusion (IR) Injury in an hDAF Pig-to-Primate Xenotransplantation Model," Xenotransplantation 10:488, (2003), Abstract.
	C9	Chapman and Choi, "Exhaled monoxides as a pulmonary function test: use of exhaled nitric oxide and carbon monoxide," Clin. Chest Med. 22:817-836 (2001).
	C10	Chin et al., "Transcriptional regulation of the HO-1 gene in cultured macrophages exposed to model airborne particulate matter," Am. J. Physiol. Lung Cell. Mol. Physiol., 284(3):L473-L480, (2003).
	C11	Choi and Otterbein, "Emerging role of carbon monoxide in physiologic and pathophysiologic states," Antioxid. Redox Signal. 4:227-228 (2002).
	C12	Cozzi et al., "Donor Preconditioning with Carbon Monoxide (CO) in Pig-to-Primate Xenotransplantation," Xenotransplantation 10:528, (2003), Abstract.
	C13	Crapo et al., "Single-breath carbon monoxide diffusing capacity," Clin. Chest Med., 22:637-649, (2001).
	C14	Deng et al., "Carbon Monoxide Potentiates Cerulein-Induced Pancreatitis in Chronic Alcohol-Fed Rats," Gastroenterology, 124(4):A618-19, (2003), Abstract.

Examiner Signature

Date Considered

EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 13681-003002	Application No. 10/053,535
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Choi et al.	
		Filing Date January 15, 2002	Group Art Unit 1616

**Other Documents (include Author, Title, Date, and Place of Publication)**

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	C15	Dyck et al., "Carbon Monoxide (CO) Attenuates Lipopolysaccharide (LPS)-Induced Cytokine Expression of IL-6," Acta Haematologica 103(Suppl 1):64, (2000), Abstract.
	C16	Günther et al., "Carbon monoxide protects pancreatic beta-cells from apoptosis and improves islet function/survival after transplantation," Diabetes, 51(4):994-999, (2002).
	C17	Hartsfield and Choi, "Mitogen activated protein kinase (MAPK) is modulated by both endogenous and exogenous carbon monoxide," FASEB Journal 12:A187, 1088, (1998), Abstract.
	C18	Hartsfield et al., "Differential signaling pathways of HO-1 gene expression in pulmonary and systemic vascular cells," Am. J. Physiol., 277(6 Pt 1):L1133-L1141, (1999).
	C19	Hartsfield et al., "Regulation of heme oxygenase-1 gene expression in vascular smooth muscle cells by nitric oxide," Am. J. Physiol., 273(5 Pt 1):L980-988, (1997).
	C20	Hartsfield, "Targeted Overexpression of Heme Oxygenase-1 (HO-1) Attenuates Hypoxia-Induced Right Ventricular Hypertrophy," FASEB Journal 13:A827, (1999), Abstract.
	C21	Horvath et al., "'Haemoxxygenase-1 induction and exhaled markers of oxidative stress in lung diseases', summary of the ERS Research Seminar in Budapest, Hungary, September, 1999," Eur. Respir. J., 18(2):420-430, (2001).
	C22	Kozma et al, "Role of carbon monoxide in heme-induced vasodilation," Eur. J. Pharmacol., 323:R1-2 (1997).
	C23	Moore et al., "Carbon Monoxide Protects against Intestinal Dysmotility Associated with Small Bowel Transplantation," Gastroenterology 122:A38, (2002), Abstract.
	C24	Moore et al., "Carbon Monoxide Suppresses the Development of Ileus Associated with Surgical Manipulation of the Small Intestine," Gastroenterology 122:A61-A62, (2002), Abstract.
	C25	Mori et al., "Evaluation of hypothermic heart preservation with University of Wisconsin solution in heterotopically and orthotopically transplanted canine hearts," J. Heart Lung Transplant. 13:688-950 (1994)
	C26	Morse et al., "Carbon monoxide-dependent signaling," Crit. Care Med., 30:S12-S17, (2001).
	C27	Morse et al., "Suppression of inflammatory cytokine production by carbon monoxide involves the JNK pathway and AP-1," J. Biol. Chem., 278(39):36993-36998, (2003).
	C28	Nakao et al., "Protective effect of carbon monoxide inhalation for cold-preserved small intestinal grafts," Surgery, 134:285-92, (2003).
	C29	Ning et al., "TGF-beta1 stimulates HO-1 via the p38 mitogen-activated protein kinase in A549 pulmonary epithelial cells," Am. J. Physiol. Lung Cell. Mol. Physiol., 283(5):L1094-L1102, (2002).
	C30	Otterbein et al., "Carbon Monoxide Inhibits TNF $\alpha$ -Induced Apoptosis and Cell Growth in Mouse Fibroblasts," American Journal of Respiratory and Critical Care Medicine 159(3 Suppl.):A285 (1999).
	C31	Otterbein et al., "Carbon Monoxide Modulates Lipolysaccaride (LPS)-Induced Inflammatory Responses <i>in vivo</i> and <i>in vitro</i> ," American Journal of Respiratory and Critical Care Medicine 159(3 Suppl.):A481 (1999).
	C32	Otterbein et al., "Carbon Monoxide, A Gaseous Molecule with Anti-Inflammatory Properties," pp. 133-156 in <i>Disease Markers in Exhaled Breath</i> , Marczin et al., eds., Marcel Dekker, Inc., New York, (2003).
	C33	Otterbein et al., "Carbon Monoxide Mediates Anti-Inflammatory Effects Via the P38 Mitogen Activated Protein Kinase Pathway," Acta Haematologica 103: 64, (2000), Abstract.

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	C34	Otterbein et al., "Carbon Monoxide Protects Against Oxidant-Induced Lung Injury in Mice Via the p38 Mitogen Activated Protein Kinase Pathway," <i>Acta Haematologica</i> 103:83, (2000), Abstract.
	C35	Otterbein et al., "Exogenous administration of heme oxygenase-1 by gene transfer provides protection against hyperoxia-induced lung injury," <i>J. Clin. Invest.</i> , 103(7):1047-1054, (1999).
	C36	Otterbein et al., "Heme oxygenase: colors of defense against cellular stress," <i>Am. J. Physiol. Lung Cell. Mol. Physiol.</i> , 279(6):L1029-L1037, (2000).
	C37	Otterbein et al., "Protective effects of heme oxygenase-1 in acute lung injury," <i>Chest</i> . 116:61S-63S, (1999).
	C38	Otterbein, "Anti-Inflammatory Effects of Carbon Monoxide in the Lung," CRISP Data Base National Institute of Health; Doc. No. CRISP/2003HL071797-01A1, (2003).
	C39	Pileggi et al., "Heme oxygenase-1 induction in islet cells results in protection from apoptosis and improved in vivo function after transplantation," <i>Diabetes</i> , 50(9):1983-1991, (2001).
	C40	Ryter and Choi, "Heme Oxygenase-1: Molecular Mechanisms of Gene Expression in Oxygen-Related Stress," <i>Antioxid. Redox Signal.</i> 4:625-632, (2002).
	C41	Ryter et al., "Heme oxygenase/carbon monoxide signaling pathways: Regulation and functional significance," <i>Mol. Cell. Biochem.</i> , 234-235(1-2):249-63, (2002).
	C42	Ryter et al., "Mitogen Activated Protein Kinase (MAPK) Pathway Regulates Heme Oxygenase-1 Gene Expression by Hypoxia in Vascular Cells," <i>Exp. Biol. Med.</i> , 228(5):607, (2003), Abstract
	C43	Sarady et al., "Carbon monoxide modulates endotoxin-induced production of granulocyte macrophage colony-stimulating factor in macrophages," <i>Am. J. Respir. Cell. Mol. Biol.</i> , 27(6):739-745, (2002).
	C44	Sarady et al., "Cytoprotection by heme oxygenase/CO in the lung," in <i>Disease Markers in Exhaled Breath</i> , Marczin and Yacoub, eds., IOS Press, 346:73-78, (2002).
	C45	Sasidhar et al., "Exogenous Carbon Monoxide Attenuates Mitogen Activated Protein Kinase (MAPK) Activation in Rat Pulmonary Artery Endothelial Cells Exposed to Hypoxia," <i>American Journal of Respiratory and Critical Care Medicine</i> . 1999;159(3 Suppl.):A352.
	C46	Sass et al., "Heme Oxygenase-1 Induction Prevents Apoptotic Liver Damage in Mice," <i>Naunyn-Schmiedeberg's Archives of Pharmacology</i> 367:R78, (2003).
	C47	Sethi et al., "Differential modulation by exogenous carbon monoxide of TNF-alpha stimulated mitogen-activated protein kinases in rat pulmonary artery endothelial cells," <i>Antioxid. Redox Signal.</i> , 4:241-8, (2002).
	C48	Sethi et al., "Differential Effects of Exogenous Carbon Monoxide on TNF- $\alpha$ -Induced Mitogen Activated Protein (MAP) Kinase Signaling Pathway in Rat Pulmonary Artery Endothelial Cells," <i>American Journal of Respiratory and Critical Care Medicine</i> 159(3 Suppl.):A350 (1999).
	C49	Seyfried et al., "HO-1 induction protects mice from Immune-mediated liver injury," <i>Naunyn-Schmiedeberg's Archives of Pharmacology</i> 367:R80 (2003).
	C50	Slebos et al., "Heme oxygenase-1 and carbon monoxide in pulmonary medicine," <i>Respir Res.</i> 4(7):1-13, (2003).
	C51	Soares et al., "Heme oxygenase-1, a protective gene that prevents the rejection of transplanted organs," <i>Immunol. Rev.</i> 184:275-85, (2001).
	C52	Soares et al., "Modulation of endothelial cell apoptosis by heme oxygenase-1-derived carbon monoxide," <i>Antioxid. Redox Signal.</i> , 4:321-329, (2002).

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	C53	Soares et al., "Heme Oxygenase-1 and/or Carbon Monoxide can Promote Organ Graft Survival," in <i>Disease Markers in Exhaled Breath</i> , Marczin and Yacoub, eds., IOS Press, 346:267-273, (2002).
	C54	Song et al., "Carbon monoxide induces cytoprotection in rat orthotopic lung transplantation via anti-inflammatory and anti-apoptotic effects," <i>Am. J. Pathol.</i> , 163(1):231-242, (2003).
	C55	Song et al., "Carbon monoxide inhibits human airway smooth muscle cell proliferation via mitogen-activated protein kinase pathway," <i>Am. J. Respir. Cell. Mol. Biol.</i> 27(5):603-610, (2002).
	C56	Song et al., "Regulation of IL-1beta-induced GM-CSF production in human airway smooth muscle cells by carbon monoxide," <i>Am. J. Physiol. Lung Cell. Mol. Physiol.</i> , 284(1):L50-L56, (2003).
	C57	Stupfel and Bouley, "Physiological and Biochemical Effects on Rats and Mice Exposed to Small Concentrations of Carbon Monoxide for Long Periods," <i>Ann. N.Y. Acad. Sci.</i> 174:343-368 (1970)
	C58	Tobiasch et al., "Heme oxygenase-1 protects pancreatic $\beta$ cells from apoptosis caused by various stimuli," <i>J. Investig. Med.</i> , 49:566-71, (2001).
	C59	Yamashita et al., "Effects of HO-1 induction and carbon monoxide on cardiac transplantation in mice," <i>Exp. Biol. Med.</i> , 228(5):616, (2003), Abstract.
	C60	Zhang et al., "Carbon monoxide inhibition of apoptosis during ischemia-reperfusion lung injury is dependent on the p38 mitogen-activated protein kinase pathway and involves caspase 3," <i>J. Biol. Chem.</i> , 278(2):1248-1258, (2003).
	C61	Zhang et al., "Mitogen-activated protein kinases regulate HO-1 gene transcription after ischemia-reperfusion lung injury," <i>Am. J. Physiol. Lung Cell. Mol. Physiol.</i> , 283(4):L815-L829, (2002).
	C62	Zuckerbraun and Billiar, "Heme oxygenase-1: a cellular Hercules" <i>Hepatology</i> , 37(4):742-744, (2003).
	C63	Zuckerbraun et al., "Carbon monoxide inhibits intestinal inducible nitric oxide synthase production and ameliorates intestinal inflammation in experimental NEC," <i>J. Amer. College of Surgeons</i> 197:S50 (2003)
	C64	Zuckerbraun et al., "Carbon Monoxide Protects Hepatocytes from TNF-alpha/Actinomycin D Induced Cell Death," <i>Critical Care Medicine</i> 29:A59 (2001)
	C65	
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**U.S. Patent Documents**

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	A1						
	A2						
	A3						

**Foreign Patent Documents or Published Foreign Patent Applications**

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							Yes	No
	B1							
	B2							
	B1							
	B2							
	B3							

**Other Documents (include Author, Title, Date, and Place of Publication)**

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	C1	Choi et al., "Therapeutic carbon monoxide may be a reality soon," Am. J. Respir. Crit. Care Med., 171(11):1318-1319 (2005)
	C2	Dolinay et al., "Can Inhalation Carbon Monoxide be utilized as a therapeutic modality in human diseases?", pp. 203-236 in <i>Breath Analysis for Clinical Diagnosis and Therapeutic Monitoring</i> , Amann and Smith, eds., World Scientific Publishing Company (2004)
	C3	Dolinay et al., "Inhaled carbon monoxide confers antiinflammatory effects against ventilator-induced lung injury," Am. J. Respir. Crit. Care Med. 170:613-20 (2004)
	C4	Mayr et al., "Effects of carbon monoxide inhalation during experimental endotoxemia in humans," Am. J. Respir. Crit. Care Med., 171:354-360 (2005)
	C5	Ryter et al., "Therapeutic applications of carbon monoxide in lung disease," Curr. Opin. Pharmacol., 6:257-262 (2006)
	C6	Ryter et al., "Heme oxygenase-1/carbon monoxide: from basic science to therapeutic applications," Physiol. Rev. 86(2):583-650 (2006)
	C7	Thom et al., "Therapeutic Carbon Monoxide May Be Toxic," Am. J. Respir. Crit. Care Med., 171(11):1318 (2005)
	C8	

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